

2015 ILRS Technical Workshop

2.5 Theoretical Performance of NASA's SGSLR System Ranging to GNSS Satellites

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NASA is proposing to replace its legacy network of MOB LAS and TLRS stations with the new Space Geodesy Satellite Laser Ranging (SGSLR) system, which is currently in its design and procurement phase. SGSLR is an upgraded version of the NGSLR/SLR2000 system which successfully completed a collocation with the NASA Standard MOB LAS-7 station in 2013. The collocation included a wide range of satellites from LEO to GNSS. Signal strength and GNSS return rate of SGSLR is expected to increase relative to NGSLR due to increases in laser pulse energy, telescope aperture, transmitter and receiver optical efficiencies, the inclusion of automated pointing correction, and low tracking mount jitter. Comprehensive link analyses performed to date suggest rather high return rates for GNSS satellites over a wide range of atmospheric conditions, but NGSLR rates to GNSS targets, while adequate, were substantially lower than originally predicted by theory. Possible reasons for the discrepancy between theory and experiment will be assessed along with potential solutions.